

On the *Cerithiopsides* from the Eastern Side of the North Atlantic, with three new Species from Madeira. By the Rev. R. BOOG WATSON, B.A., F.R.S.E., F.L.S., Hon. Fellow of the Naturwissenschaftlich Verein Lüneburg.

[Read 15th January, 1885.]

(PLATE IV.)

THE whole of the Madeiran Cerithiopsides, except *C. Metaxæ*, Chiaje, so much resemble the large elongated variety of *C. tubercularis*, Mont., that for their determination the points of difference alone require to be noted; but for the sake of comparison, and to remove confusion between the little-known species of the group, I add here some notes of all the species found in the North-east Atlantic, none of which, so far as I know, have been adequately figured. On the Mediterranean species I do not enter, in the hope of speedily seeing them fully described and figured by the Marquis de Monterosato, to whose kindness I am indebted for the knowledge of them, and who has already given some valuable notes on the group in the 'Journal de Conchyliologie,' 1874, p. 274, 1877, p. 41, as well as in his 'Enumerazione delle Conchiglie mediterranee,' p. 39, and more recently in his 'Nomenclatura di alcune Conchiglie mediterranee,' p. 124.

I have not included in this list the *C. pulchella*, C. B. Adams, from Jamaica, nor the Massachusetts species, viz. *C. Emersonii*, C. B. Ad., *C. terebralis*, C. B. Ad. (which, teste Dr. Gwyn Jeffreys, is a *Cerithium*=*C. trilineatum*, Phil., of the Mediterranean), and *C. Whiteavesii*, Verrill (which Dr. Gwyn Jeffreys asserts to be *Cerithium metula*, Lovén, not the Mediterranean species thus called by Delle Chiaje). These lie beyond the limits I have assigned myself; and the same is the case as regards the two species from Wydah in the Bight of Benin (see Proc. Zool. Soc. Lond. 1871, p. 736, pl. lxxv. figs. 21 & 22), regarding which, however, I may say that *C. carinata*, E. A. Sm., is certainly distinct from any North-Atlantic species, and that *C. gemmulifera* has suffered from exfoliation so as to have become unrecognizable.

The species with which I have to deal may be classified thus:—

I. Those with a smooth apex.

1. Apex somewhat stiliform.

(1) *Cerithiopsis tubercularis*, Mont.

(2) *C. Jeffreysi*, Wats.

2. Apex not stiliform.

(3) *C. costulata*, Möller.

II. Those in which the longitudinal ribbing of the apex is notable.

1. Apex somewhat stiliform.

(4) *C. Barleei*, Jeffr.

(5) *C. fayalensis*, Wats.

2. Apex not stiliform.

(6) *C. tiara*, Wats.

III. Those in which the spiral threads of the apex are notable.

(7) *C. Clarkii*, Forb. & Hanley.

IV. Those in which the apex has ribs and one or more spirals.

(8) *C. diadema*, Wats.

(9) *C. atalaya*, Wats.

V. Those in which the apex is fretted or reticulated.

(10) *C. Metaxæ*, Chiaje.

(1) *C. TUBERCULARIS*, *Mont. Test. Brit.* p. 270 (Murex).

Has a small elongated apex, which is in form slightly conical, but more nearly cylindrical, consisting of four small, perfectly smooth, convex whorls parted by a horizontal slightly impressed suture; the tip is rounded and immersed. On the base of the shell is a circumbasal thread separated from the tubercled threads on the side of the body-whorl by a deep narrow furrow; another thread encircles the base of the pillar; between these threads is a broadish shallow basal furrow; on the pillar near its foot and behind the lip-edge is more or less of a twisted swelling (the scar of the old canal) simulating a thread.

Hab. Great Britain to Madeira and the Mediterranean.

(2) *C. JEFFREYSI*, *Wats.* (= *C. pulchella*, *Jeffr. Ann. & Mag. Nat. Hist.* 3rd ser. vol. ii. p. 129, pl. v. fig. 8, but name preoccupied by C. B. Adams).

Is in general form of straighter outline than *C. tubercularis*, *Mont.*; the individual whorls are more convex; the longitudinal ribs and the spiral threads are finer, and the tubercles at their intersections smaller, with much larger open square interstices; the embryonic apex, which is also perfectly smooth, is a little smaller and narrower, in particular the third and fourth whorls are narrower and less tumid, and the suture is more oblique. On the subconical and not depressed base there is only one feebly tubercled thread, and it is circumbasal; within it are radiating lines; a scar of the old canal encircles the pillar a little above its foot; the pillar is rather long and narrow.

Hab. Plymouth, Guernsey, Cornwall, in England; Antrim in Ireland; Villafranca (*Jeffreys*), Sicily, Naples, in the Mediterranean. Fossil in the Tertiaries of Calabria (*Monterosato*).

(3) *C. COSTULATA*, *Möller*, *Kröyer's Tidsskrift*, vol. iv. p. 83, 1842 (*Turritella*).

This species is broad, stumpy, and little like a *Cerithiopsis*: the whorls are convex, the suture impressed; the longitudinal ribs are strong, the spiral threads feeble and few; the flatly conical base is levelled up so as to hide both ribs and threads, but is scored by faint convex lines; the edge of this raised flat forms a strong circumbasal thread; round the base of the pillar twists an almost obsolete thread, the scar of the old canal. The apex is cylindrical, and consists of three convex short broadish nearly equal whorls, of which the first two are doubtfully fretted with very faint microscopic spiral scratches, and the third has besides about twenty-five very fine, barely convex, unequally parted riblets: the extreme tip is subtumid, but not prominent.

Hab. Greenland (*Mörch*), in 1622 fathoms (*Wallich*), to Fundy Bay (*Verrill*); Iceland (*Torrell*); Norway, from the North Cape in 80 to 300 fathoms (*Sars*), to S. Sweden and Shetland, 84-86 fathoms (*Jeffreys*). Fossil in the Post-tertiaries of Scotland and Sweden.

(4) *C. BARLEEI*, *Jeffr. Brit. Conchol.* iv. p. 268.

Is broad and conical, with a large but rather shallow suture; the ribs and spiral threads are nearly equal, and their intersections are not very strongly tubercled. The apex, though it has about half a whorl more, is very like that of *C. fayalensis*, having the extreme tip smooth, and the succeeding whorls longitudinally ribbed; but in *C. Barleei* these riblets, of which there are about thirty on each whorl, are very fine, like hairs, and their interstices are microscopically fretted with very faint spiral scratches. The first regular whorl has three spiral threads which cross longitudinal ribs very like themselves. In *C. fayalensis* the apex is slightly shorter than in *C. Barleei*, the longitudinal riblets are stronger, less superficial, fewer (about twenty to a whorl), and though oblique they are less so than in *C. Barleei*. The first $1\frac{1}{2}$ regular whorls have only two spiral threads crossing longitudinal riblets which are stronger than in *C. Barleei*. The suture throughout is less strong and open.

On the base of *C. Barleei*, considerably within the edge, there is a flat, rather weak, untubercled or obsoletely tubercled spiral thread, within which the subconical radiatingly striated base is not depressed; a very feeble scar of the old canal encompasses the base of the pillar. In *C. fayalensis* the circumbasal thread is stronger and more nearly tubercled; and the base within this thread is slightly depressed; the scar of the old canal is scarcely traceable.

(5) *C. FAYALENSIS*, *Wats.* (= *C. corona*, *Wats. MS.*, see Monterosato, *Journ. de Conch.* 1875, p. 41, No. 94), *Journal Linnean Society, Zool.* vol. xv. p. 125.

Has an elongately conical apex of four rather short convex whorls, of which the extreme tip is rounded and smooth, and the other three are scored with distinct curved longitudinal ribs. The base, which is a little impressed and strongly radiatingly striate, has a single strong circumbasal thread which is fretted, but hardly tubercled.

Hab. Madeira, 0-50 fathoms (*Watson*); Fayal, Azores, 450 to 500 fathoms ('*Challenger*' *Expedition*, St. 75); coast of Portugal and Spain down to a depth of 220 fathoms at St. 13 ('*Porcupine*' *Expedition*).

(6) *C. TIARA*, *Watson.* (See Monterosato, *Journ. de Conch.* 1874, p. 274, No. 168.)

Has a blunt apex consisting of three whorls, of which the rounded tip is smooth and prominent; the two following whorls are strongly longitudinally ribbed; they are all convex, and are parted by a deep suture. The base of the shell is square, and has two small circumbasal threads, both lying well within the periphery; they are parted by a very fine furrow; the outer one is feebly tubercled; the depressed basal flat between the inner one and the pillar is minutely but sharply radiatingly striated.

Hab. Madeira, 0-50 fms. (*Watson*), and Palermo, Sicily (*Monterosato*).

(7) *C. CLARKII*, *Forb. & Hanl. Brit. Moll.* vol. iii. p. 368, pl. ciii. fig. 6.

Has an embryonic apex of $2\frac{1}{4}$ whorls, which are dull and roughish. The tip is brown, mamillary, and large. The next whorl is rather larger than that which follows, and is bicarinated by two remote strongish threads which gradually approximate. There are only two tubercled spiral threads on the regular

whorls; and these threads form a more prominent feature than the longitudinal riblets; their intersections are marked by square flat-topped largish tubercles. The upper thread becomes broader down the spire, and splits into two approximate tubercled threads; so that on the last whorl there are three rows of tubercles. The lowest thread has a strong furrow below it within the contraction of the base; below this furrow is a large tubercled thread (which does not appear in the figure) occupying nearly the entire base; crowded in on the foot of the pillar is a small thread, darker than the rest. The twisted pillar is very short and stumpy (very much more so than the figure represents), and the canal lies quite in behind it. The whole shell is of a rich glossy dark-chestnut colour. The suture is deeper and less broad than in the figure.

Hab. The Mediterranean. One rubbed specimen was found by Mr. Clark at Exmouth: it had probably been imported.

I owe a sight of the Mediterranean specimen of this species to the kindness of the Marquis of Monterosato, to whose promised monograph I must refer for a figure of this form. The figure in the 'British Mollusca' leaves very much to be desired; it wants the apex, it presents a quite fictitious mouth and pillar, and fails to catch the general sculpture and the ornamentation of the base.

(8) *C. DIADEMA*, *Wats.* (See Monterosato, *Journ. de Conch.* 1874, p. 273, No. 167.)

Has a long, narrow, cylindrical, barely conical apex of four whorls, of which the tip is blunt, rounded, and finely spiralled; and is followed by three feebly convex whorls parted by a very slightly impressed suture: these whorls are on the upper part very finely scored with longitudinal riblets, and near the bottom are keeled by a sharp angularly projecting spiral thread. On the base of the shell there are two circumbasal spiral threads, the outer of which lies close to the lowest of the lateral spirals, and is feebly tubercled; the inner spiral is rather prominent, lies well within the base, and is separated from the outer by a broadish but rather shallow furrow; within it lies the flat, barely depressed centre of the base encircling the pillar.

Hab. Madeira, 0 to 50 fathoms (*Watson*); Palermo, Sicily, 54 fathoms (*Monterosato*). The 'Porcupine' got it in 1870 at Benzert Road in 40 to 65 fathoms; at Rasel Amoush, 45 fathoms; and on the Adventure Bank in 92 fathoms, Mediterranean.

(9) *C. ATALAYA*, *Watson*. (Hebrew הַלִּיטָה , a Phœnician word for a watch-tower.)

Has a long, narrow, subcylindrical apex of four whorls, which are parted by a broadish, very slightly impressed suture: the tip is blunt, rounded, and smooth (or perhaps, when quite fresh, very faintly fretted); the other three apical whorls are very finely scored longitudinally by slightly fretted riblets which, near the bottom of each whorl, are cut across by two small approximate spiral threads. On the base just within the contraction is a single circumbasal thread, between which and the pillar the base is very slightly and flatly depressed, and is scored across by minute radiating bars.

Hab. Madeira, 0-50 fathoms (*Watson*).

(10) *C. METAXÆ*, *auctorum* (*Chiaje*? See *Monterosato*, *Nomenclatura*, p. 125.)

Has inferiorly convex whorls and an impressed suture. It is excessively long, with very straight profile-lines. The apex consists of four nearly cylindrical and almost equal whorls, of which the first is subtumid, with a slightly immersed tip; it and the following whorl are completely covered with minute microscopic frettings or stippings which, especially above the suture, are seen to be arranged in spiral lines: the next two whorls are scored with longitudinals, which above at the suture are straight and distinct (though very fine) bars twenty-five to thirty in number, but lower down become wavy and somewhat obsolete. The base a little within the periphery is encircled by a strong untubercled thread: the middle of the flattened base, which is slightly sunken, is scored with very fine hair-like convex lines; round the base of the very short, broadly conical, and small-pointed pillar coils a very obsolete thread, the scar of the old canal.

Hab. From Shetland to the Canaries and the Mediterranean.

In this species it is not difficult to separate two varieties, in one of which the whole surface of the shell is comparatively smooth; in the other it is angular and bristles with points: it is the latter which is the *C. angustissima*, *Forbes*; the other is *C. rugulosa*, *Monterosato*. The two forms, however, run into one another; and the very curious microscopic sculpture of the apex is identical in the two. A really remarkable approach to the latter form (*C. rugulosa*) is presented by the *Bittium abruptum*, *Watson*, from *Fayal*, *Azores* (see 'Challenger Prelim. Report,' *Linn. Soc. Journ.*, *Zool.* vol. xv. p. 119); but the apex is entirely

diverse, and is constant in its diversity; and there are other differences which, though eluding attention at first, are really very marked.

DESCRIPTION OF PLATE IV.

All the shells are considerably enlarged; the apices of each still more magnified.

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|----------|-------|------------------------------------|-----------------------------------|
| Figs. 1, | 1 a. | <i>Cerithiopsis tubercularis</i> , | Mont. |
| 2, | 2 a. | „ | <i>pulchella</i> , Jeffr. |
| 3, | 3 a. | „ | <i>costulata</i> , Möller. |
| 4, | 4 a. | „ | <i>Barleei</i> , Jeffr. |
| 5, | 5 a. | „ | <i>fayalensis</i> , Wats., n. sp. |
| 6, | 6 a. | „ | <i>tiara</i> , Wats., n. sp. |
| 8, | 8 a. | „ | <i>diadema</i> , Wats., n. sp. |
| 9, | 9 a. | „ | <i>atalaya</i> , Wats., n. sp. |
| 10, | 10 a. | „ | <i>Metaxæ</i> , Chiaje. |

The above figures correspond with the numbers in the foregoing description, but No. 7, *C. Clarkii*, is not here figured, having already been illustrated in Forbes and Hanley, *l. c.*

On the Anatomy of the Ambulacra of the Recent *Diadematidæ*.

By Prof. P. MARTIN DUNCAN, V.P. Linn. Soc., F.R.S., &c.

[Read 5th March, 1885.]

(PLATE V.)

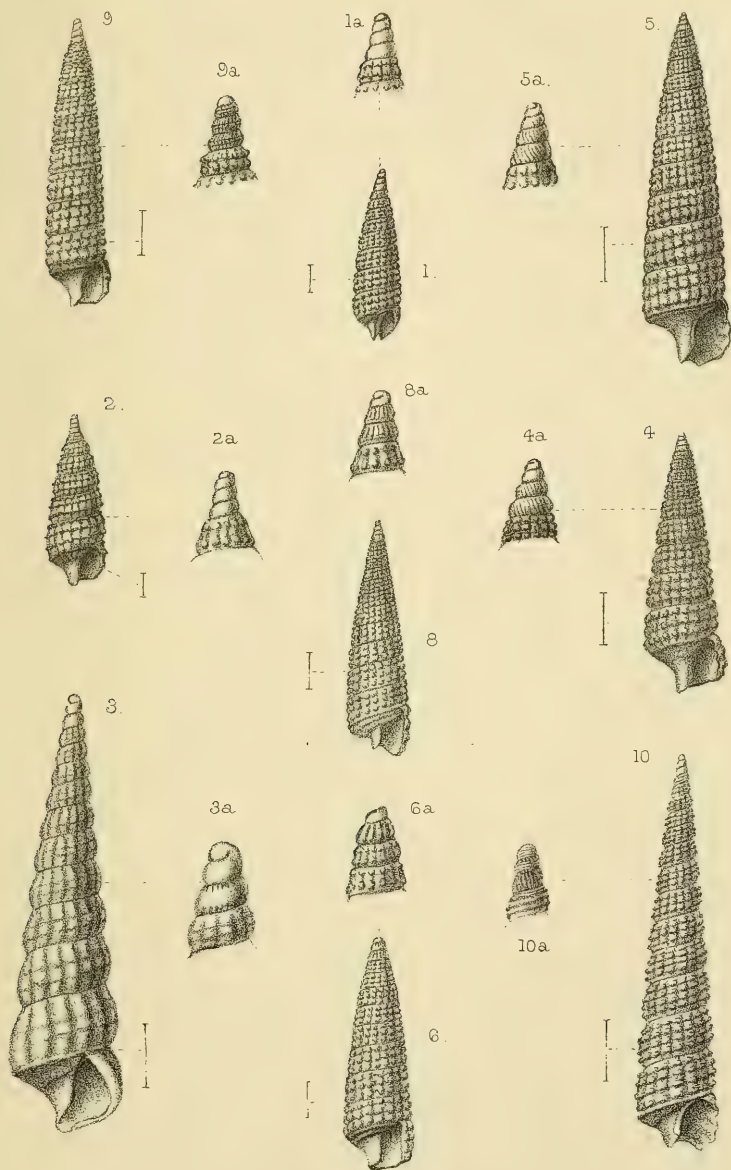
CONTENTS.

- I. Introduction.
- II. The ambulacra of *Diadema setosum*.
- III. The structure of the edges of the plates (interambulacral and ambulacral).
- IV. The ambulacra of *Echinothrix Desori* and *E. calamaris*.
- V. The ambulacra of *Astropyga radiata* and *A. pulvinata*.
- VI. The ambulacra of *Centrostephanus*.
- VII. The ambulacra of *Micropyga tuberculata*.
- VIII. The ambulacra of *Aspidodiadema microtuberculatum*, Agass.

I. INTRODUCTION.

In a communication on some hitherto unobserved structures of the Arbaciadæ, which was read before this Society by Mr. Percy Sladen and myself on February 5, 1885, we stated that the classificatory part of our essay would be given subsequently.

At that time we were not aware of the bearing of some of the structures of the test of the *Diadematidæ* on the general question



SPECIES OF CERITHIOPSIS

1. *tubercularis*. 2. *Jeffreysi*. 3. *costulata*. 4. *Barleei*.
 5. *fayalensis*. 6. *tiara*. 8. *diadema*. 9. *atalaya*. 10. *Metaxæ*.
 (sp. 7 not figured.)